DOCUMENT RESUME

ED 465 876 CE 083 502

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TITLE A Search for Effects of High Schools' Work-Related Programs on Early Employment Success in the New Economy.
INSTITUTION Mid-Atlantic Lab. for Student Success, Philadelphia, PA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.; Temple Univ., Philadelphia. Center for Research in Human Development and Education.
PUB DATE 2002-04-00
NOTE 26p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 1-5, 2002).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Achievement; Economic Change; *Education Work Relationship; Educational Attainment; Employment Level; Employment Patterns; Employment Qualifications; *Entry Workers; *High Schools; Higher Education; Job Skills; Least Squares Statistics; Literature Reviews; Longitudinal Studies; Models; National Surveys; *Outcomes of Education; Partnerships in Education; Racial Differences; Salary Wage Differentials; *School Business Relationship; Sex Differences; Skill Development; Success; Vocational Education; *Work Experience Programs
IDENTIFIERS National Education Longitudinal Study 1988

ABSTRACT

The empirical basis for expectations that employer involvement in high school programs contributes to early employment success in today's economy was explored by using data from the National Educational Longitudinal Study (NELS) survey for 1992, when students were sampled in their senior year, and data for 1994, when follow-up interviews with the same students were conducted. Early employment success was indicated by earnings in the first calendar year after grade 12. Ordinary least squares regression was used to build two annual earnings models--one for the subsample that was primarily in the workforce (the W population) and the other for the sample that was primarily in postsecondary education (the PSE population). The number of high school programs that involved employers did not contribute to early employment success; however, the number of other work-related high school programs did contribute to earnings, albeit only in the PSE populations. Concentration in vocational education during senior year did have an earnings payoff in the first full calendar year after high school, albeit not for males in the PSE population. The racial and gender gaps were significantly lower in the PSE sample than in the W sample. (The bibliography lists 22 references. Information about the NELS variables and their sources is appended.) (MN)

A Search for Effects of High Schools' Work-Related Programs on Early Employment Success in the New Economy

Paper Presented to the American Educational Research Association, New Orleans, Louisiana, 2002

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Abstract

Using National Educational Longitudinal Study data from 1992 and 1994, this study explores the empirical basis for expectations that employer involvement in high-school programs contributes to early employment success. Early employment success was indicated by earnings in the first calendar year after 12th grade. Using ordinary least squares, I developed models for two samples of youth: one who worked but were primarily in postsecondary education programs (E) and another for a more standard sample primarily in the workforce (W). The models E and W differed significantly, with school programs among the variables contributing differently. Employer involvement in school programs did not contribute in either model, though other work-related programs (e.g., career counseling and interest inventory administration) had positive effects in E. Interpretation of this finding also shed light on findings of significantly lesser gender and racial gaps in E than in W.

Over the past 10 years, there have been authoritative calls for greater involvement of employers in various aspects of high-school programs, in order better to prepare youth for the work world (Committee for Economic Development, 1998). Promoting this employer-involvement orientation, the School-to-Work Opportunities Act (STWOA) was put into force in 1994. The STWOA called for the formation of partnerships among educators at all levels and representatives of the work world—including employers, labor unions, and industrial associations. A major purpose of the partnerships was to make schooling more relevant to needs of the economy (Reich, 1995). There had been considerable concern that the needs of the "new economy" for general cognitive and communication skills had increased considerably since the early 1980s, but that educators had not been adequately aware of the demand for these skills (Committee for Economic Development, 1996; Secretary's Commission on Achieving Necessary Skills, 1991). The thinking behind STWOA was that if educators could be in working partnerships with employers, the educators could gain a better knowledge of the work world outside the school, and the employers could have direct input into building a more work-related curriculum. Thus,

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the educator's experience and the employer's input would modify the curriculum and other programs in high school to incorporate these new work-related skills.

Although employment-oriented, STWOA is different from previous legislation and thinking about the role of the high school in preparing students for the work world: It targets all students—the college-bound as well as those who will probably seek full-time employment immediately after high school (Olson, 1997). As presented above, the new economy is characterized as requiring general cognitive and communication skills—the same skills that college-bound students should be developing. Thus, it has been argued that the academically oriented courses in English, mathematics, science and social studies should be modified to accommodate work-related examples, exercises, and contexts. As a result of these modifications, a vocationally oriented student could take the courses and be exposed to the needed cognitive and communication skills, and a college-bound student—who would also sooner or later be in the workforce—would benefit as well.

Both the employer-involvement aspect and the all-encompassing nature of programs made possible by the funding of the STWOA have been subjects of study in the official STWOA evaluation, which is being conducted by Mathematica Policy Research. The evaluation team at Mathematica has found (a) employer involvement in STWOA partnerships has been continually increasing from a substantial start during the 5 years of the funding and (b) all students—in academic, vocational, and general (undecided) programs—tend to participate in the programs developed with the funding (Hershey, Silverberg, Haimson, Hudis, & Jackson, 1999). Additionally, they report that employer-contact aspects of STWOA programs in schools were judged by a majority of students 18 months after their senior year as "very helpful" in clarifying their career goals. The evaluators note that this high rating was given even more frequently by females, Blacks, and Hispanics, and they point out that these groups are ones traditionally having a more difficult time in the labor market. However, they caution that their follow-ups with graduates do not allow them to infer anything about the effect of any aspect of STWOA on employment success.

In fact, the enthusiasm for employer involvement in schools does not seem to be based on any widely available research or program evaluation. In my search of the literature, I have found only one study that includes any aspect of employer involvement in schools. That study, as discussed below, considered only job postings in schools and revealed results that the researchers found promising, though they did not quite reach statistical significance. Although rigorous studies of high-school programs in general have not yielded strong or even consistent effects on employment success, it is plausible that employer involvement—implying a direct connection of schools with the work world—might have a positive effect on students' employment success.

Related Research

In this section I consider various studies of high-school effects on employment success—specifically reviewing results related to employer involvement, other school work-related programs, participation in vocational-education programs, and the general cognitive and communication skills presumably being developed in high-school courses.

School Programs with Employer Involvement. The one study that has analyzed the effect of an employer-involvement variable on employment success is by Crawford, Johnson, and Summers (1997). Using the High School and Beyond data, Crawford et al. included in their analysis a question asking school administrators whether employers provided their respective schools with announcements of job openings. When included as a part of a regression analysis of earnings 3 years after high-school senior year, this variable had a positive coefficient very close to statistical significance at the .10 level. With the exception of a dummy variable for private, religious school, this "job listings" variable was the only one of 15 school variables that even approached statistical significance. In addition, they found increase in earnings was related to being male, being White or Asian, having a higher family income, and having a higher grade-point average. They also found that being married and that participating in a vocational education program had a negative effect on later earnings. However, working outside the school program for more than 15 hours a week during high school had a strong positive effect.

Using the same data source as Crawford et al. and approximately the same sample, but with hourly wage rather than annual earnings as the dependent variable, Stull (1995) found no clear support for the positive contribution of any aspect of high-school background on the wages of noncollege youth 2 years after high school. He did find that work outside the school program during high school and after, higher socioeconomic status, being married (but only if male), and positive employment conditions in the school's county and region of the country were independent contributors to the wage estimation models he built.

Other Work-Related School Programs. High schools also offer more general work-related support for students. There are career counseling and job placement services, sometimes connected with vocational education or other special student groups (e.g., potential dropouts) but also often available for all students in the school. Stern, Finkelstein, Stone, Latting, and Dornsife (1995) summarize the results of the small amount of research done concerning these services: "Despite the difficulty of evaluating the effectiveness of career counseling and job placement programs *per se*, the literature on the school-to-work transition continues to identify these as important features of effective practice" (p. 54).

Vocational-Education Concentration. One variable that might be assumed to relate to early earnings is exposure to vocational education in high school. Recently, Mañe (1999) reviewed research

literature on this topic and concluded that, in general, vocational-education courses have a positive effect on early employment success. However, in order to deal with open issues of longevity of the effects and of persistence of the effects with changes in the labor market, he conducted a massive study of hourly wages and earnings 21–24 months after high school ("short run") and for each year from the 3rd through the 5th or 7th year after high school ("medium run"), over two cohorts (one in high school in the early 1970s, the other in the early 1980s). His primary focus was to study employment success effects of taking varying numbers of vocational courses versus taking academic courses. While he found no support for effects of vocational courses on hourly wages, he did find positive effects for both males and females, strong in the short run and significant though declining in the medium run, on yearly earnings in the 1980s cohort. Mañe's additional study of short-term effects in the NELS survey data of the early 1990s suggests that this early vocational-education effect on earnings during the 1980s has continued into the 1990s.

Although Mañe's conclusion would suggest that students who follow a vocational education program in high school would have higher earnings soon after school, Stern et al. (1995, ch. 4), reviewing research on employment outcomes of such programs, indicate that the positive effects are present only when the particular vocational program matches the job the graduate gets. Perhaps this job-relatedness condition is the reason that studies have not always revealed vocational-track benefits and that benefits revealed were not long-lived. Furthermore, the proportion of variance accounted for in Mañe's massive models amounted to .20 at most, but more often below .10. In summary, it seems that high-school programs designed to prepare students for specific work do not generalize very much to other work settings. Thus, studies that do not consider the congruence between the high-school vocational-education programs and the later work are less likely to show benefits.

General Cognitive and Communication Skills. Finally, in line with the emphasis of STWOA and many related policy statements, there is the issue of whether general (i.e., non-task specific) cognitive and communication skills that high schools try to foster in required courses do result in employment success. Some research reports, such as Barton (1999); Murnane, Willett, and Levy (1995); and Neal and Johnson (1996), show that much of the stylized findings of the education premium can be accounted for by scores on tests of cognitive and communication skills—such as high-school-level tests of math and reading comprehension developed by the Educational Testing Service for several national longitudinal surveys (one of which is used in the present study) and the Armed Forces Qualification Tests. However, it is curious that in these studies, the education premiums and test effects are not revealed until some 6 to 8 years after the person's senior year in high school!

Because the Barton (1999), Murnane et al. (1995), and Neal and Johnson (1996) studies used data coming somewhat prior to the "new economy," it can be argued that they do not reveal the more recent demand for the general cognitive and communication skills earlier in an employee's career. There are related studies that use more recent data sources, from the early to middle 1990s. However, they use interview methodology to capture what skills employers look for in new hires recently out of high school. Holzer (1995) sees these studies as providing a demand perspective, in contrast to the previously presented regression studies, which he characterizes as studies of market supply. In addition to being more contemporary, such demand-side study has greater contextual detail. Thus, while the interview studies I discuss below have weaknesses of small samples, few variables held constant, and considerable subjectivity, they do provide more recent information about possibly important high-school contributors to employment success.

Holzer (1996) found in 1993–94 interviews that employers were looking for general cognitive and communications skills in their noncollege new hires. He reports (p. 49) that highest among the skills employers say are needed daily is arithmetic—with 65% of such jobs requiring arithmetic daily. Next among other tasks performed daily were (a) dealing with customers in person—58% of such jobs required, (b) reading paragraphs—55%, and (c) dealing with customers on the phone—53%. Holzer concludes that these types of tasks obviously indicate a need for general cognitive and communication skills on the part of the workforce that does not have a college education.

However, employers may not know what information to use to evaluate whether a prospective entry-level new hire has the requisite skills. Grubb (1996), who interviewed employers of new hires with high-school diplomas but not bachelor's degrees, found that the employers did not trust school grades as indicators of job performance (p. 33). (Even so, the employers he interviewed did say that a high-school diploma was "universally" required for being hired.) Interestingly, Grubb's interviews did reveal that later, when an employee was being considered for promotion, more general cognitive and communication skills were taken into account (pp. 42–43). Thus, any prehire information about these characteristics might not be trusted, though the employer would consider these skills later, after having firsthand experience of working with the employee for some time. If this were the case, it would not be until these later personnel decisions were made that the more general skills would show up as determinants of wage differences. Because workers who had graduated high school but not college would more likely be working for smaller firms (Grubb, 1996, pp. 15–17), the opportunities for advancement might not come frequently. This delay in opportunity for advancement could delay for several years the appearance of the cognitive-skills relation to earnings, even though the skills were relevant from the start.

Rosenbaum and Binder (1997) also interviewed employers about the skills they look for in new hires and about how they use information about skills in retaining employees. The researchers found that the majority of the employers they interviewed (a) could clearly describe what math and English skills the jobs in their firms require, (b) did not trust school records or most school staff to indicate which students do have the needed skills, but (c) did take steps to select and retain the workers who demonstrate these skills. These researchers found that some employers became involved with schools in order to obtain better information about the skills of potential employees. They suggest, however, from past research that the relationship between employer's needs and employee's wages "is far from perfect, since wages are also affected by pay hierarchies; compensation systems; and norms of age, gender, status, and so on . . . including job-evaluation systems that explicitly constrain pay levels by the imputed value of particular credentials" (p. 69). Thus, Rosenbaum and Binder's conclusions suggest that even though general cognitive and communication skills are important, their importance may not be revealed in studies relating measures of those skills to early employment success as measured by wages.

Primarily Workforce Versus Primarily Postsecondary Education Populations. All previous studies have focused on the postsecondary employment experience of youth who were *not* involved in postsecondary education (PSE). I believe that this orientation has arisen from the assumption that those who are not involved in PSE are beginning their work careers, while those who are involved in PSE have not yet embarked on that type of work. However, that assumption is not well warranted by recent analyses (Zemsky, Shapiro, Iannozzi, Cappelli, & Bailey, 1998). On the one hand, there is considerable movement ("churning") from one job to another in at least the first several years after high school. These authors also point out that employers look for skills needed to do the specific tasks involved in the entry-level job and tend not to provide training to employees in this age group—in contrast to what one might expect with career-building jobs. On the other hand, the churning seems to include not just movement from job to job, but also movement between, and overlap of education and work. Zemsky et al. (Display 3.2) show that 2 years out of high school, youth in 1984 were somewhat less likely to be combining work with college (14%) than they were to be going to college without working (18%). Comparison of the percentages for the same-aged youth in 1994 shows somewhat more combining work with college (25%) than going to college without working (19%). These considerations, combined with the emerging orientation to foster high-school work-related programs that do not distinguish between vocational and academic students, lead to the question of whether the models of determinants of earnings might be the same for PSE and non-PSE youth.

The Present Study. The present study explores the open issues raised in the research discussed in this section. It includes a more complete measure of employer involvement than the Crawford et al.

(1997) study, as well as containing a measure of other general work-related school offerings (e.g., career counseling and job placement). It also explores the relative effects of these work-related programs on females, Blacks, and Hispanics. The present study also takes up the issue of the general effects of vocational-education participation and the value of general cognitive and communication skills. The samples are from the early 1990s, well after the onset of the so-called "new economy," so that any independent contribution of the general cognitive and communication skills should be evident. In addition, the study is of two samples: One sample is similar to past studies in that it contains youth who are totally or predominantly in the workforce. The other sample is of youth who do work but are predominantly involved in PSE. The regression models include as control variables the sampled youths' gender, race, family socioeconomic status, and hours worked during senior year. Indices were also included to control for local and regional labor markets. The dependent measure of employment success, annual earnings, was measured for the calendar year immediately following the senior year, in order to explore the labor market's early reactions to youth with different school-related backgrounds.

Data and Sample

The data for this study are from the National Educational Longitudinal Study (NELS) survey for 1992, when sampled students were in their senior year, and for 1994, from follow-up interviews (see National Opinion Research Center, 1993). The variables and their sources in NELS are identified in Appendix 1. The measures are from (a) the 1992 student questionnaire, (b) administrators' 1992 answers to questions about the students in their respective schools, (c) the 1992 administrator questionnaire on school characteristics, (d) follow-up interviews (primarily by telephone) during 1994 of those who were seniors in 1992, and (e) location codes provided by NELS: 88 staff for the school in 1992.

The total sample is those 1992 public-school students who were not classified by the NELS staff as being "out of the workforce" or "a postsecondary education student, not employed" in 1994 and for whom there are both earnings data for 1993 and predictor variables from 1992. These cases were divided into two samples, one for youth who were primarily in the workforce (even if unemployed at the time) and the other for youth who were working but were primarily involved in postsecondary education (PSE). This division was accomplished using a variable derived in the NELS data-coding process. This variable and related frequencies are presented in Appendix 2.

Finally, the samples on which the following models were developed were selected to eliminate cases in the top 1% of earnings in the primarily workforce sample and the cases in the primarily PSE sample that were above the earnings level (which was $27,500) used to remove the top 1% in the workforce sample. This restriction was carried out for several reasons. First, there were some very extreme outliers—five cases that had earnings above $75,000, with the next lower values being in the

lower $40,000s. Other cases were not as extreme but were still distinctly outside the otherwise smooth distribution of the earnings variable. Although comparisons with other variables indicated no other irregularities for these cases, I ran regressions for several levels of restriction of the samples. In these restricted sample regressions, the changes in amount of variance accounted for and in statistical significance of almost all coefficients that occurred with the restriction in sample were extremely minor. The only noticeable changes came for two coefficients—to be noted later in the presentation of results—when the top five outliers were removed. The decision to remove the top 1%, however, was made to provide comparability with the restriction used by Crawford et al. (1997), with which study the present one is most substantively comparable. Appendix 3 presents the descriptive statistics for the variables in the samples for the following analyses.

Analyses and Results

With the aid of SPSS, I used ordinary least squares regression to build two annual earnings models, one for the primarily workforce sample and the other for the primarily PSE sample. The models contain the same independent variables. Results are presented in Table 1. The *F*-ratio for each of the two models is statistically significant. The model for estimating annual earnings in the workforce sample has an adjusted *R*-squared of .105, while the model for estimating earnings in the PSE sample has an adjusted *R*-squared of .096. Eight of the 22 variables made statistically significant contributions in the primarily workforce model, while there were 9 in the PSE model. Only one of the nine interactions was statistically significant, and it was significant in the PSE sample only. I present commentary about the individual findings in the following discussion section.

In the rightmost two columns, Table 1 presents the results of a comparison of the primarily workforce model with the primarily PSE model. The *F*-statistic is from the Chow test and is statistically significant, indicating that the two models do differ. Comparisons of the coefficients for the variables were conducted with *t*-tests, and those differences that were statistically significant are indicated also in Table 1. These individual findings will be considered in the discussion section along with comments on statistical significance of the respective individual variable in each of the two samples. Note that no comparison of coefficients from the two models was statistically significant without the coefficient in at least one of the two samples being significantly different from zero.

To facilitate interpretation of the findings, Table 2 provides effect-size information for those coefficients and differences between coefficients in the two samples that were statistically significant. In the case of the dummy variables, each coefficient itself is readily interpretable as the size of the variable's independent effect in the model. However, where the variable was treated as an interval scale, the effect size was obtained by converting the coefficient value into an amount corresponding to the

standard deviation of the variable in the respective sample. Furthermore, in the three instances in which I computed amounts of differences in effect sizes between the two samples and the variables were treated as interval scales, I used the average of the standard deviations in the two samples. In all three cases, the standard deviations were quite close in size.[1] The effect sizes of the various variables are discussed along with the other results in the following section.

Note that although the effect sizes are precise dollar amounts for the effects, the reader should remember that the earnings data are from self-reports in a phone interview with no verification of the information. The author considers the effect-size information to be only rough approximations.

Discussion

Accounting for only 10.5% and 9.6% of the variance in earnings, the two models in this study leave much of the earnings within the first full calendar year out of high school without determinants. By comparison, the other regression studies of 1980s and 1990s national survey databases cited in this paper (i.e., Crawford et al., 1997; Mañe, 1999; Stull, 1995) had models that accounted for 8.4% to 20.2% of variance in early employment compensation. In the study most comparable in sample and dependent variable to the present workforce one, Mañe (1999, p. 425) accounted for between 8.4% and 12.2% of earnings variance with a model that was considerably more extensive in independent variables than the present ones. Thus, the results of the present study are within the range of past studies. Nonetheless, in seeking to explain the generally low predictive capability of these models, I refer to Stull (1995), who suggests two factors (pp. 12–13). One is measurement error, which could be assumed to arise from the relatively unchecked way in which the compensation data are collected in the surveys. The second factor is the "large amount of randomness" that exists in reality in the youth labor market. With this context in mind and noting that the models in this study did both produce statistically significant amounts of variance accounted for, I move to a discussion of the individual variables in the models.

Work-Related School Programs. The primary reason for this study was to determine if a high school's provision of work-related programs is associated with its seniors' early employment success. Because there has been much attention given in the past decade to involving employers in STW programs of a school, the study distinguished between those school programs that were likely to have employer involvement and those that were not. The findings in the study provide some indication that at least one type of work-related school program contributed positively to seniors' early employment success. However, the type of work-related program that made a contribution was the one that included interest inventories, aptitude testing, and career counseling services—not the type that usually involves

[1] The ratios of the larger to the smaller of the sample variances—*F*-ratios—were 1.01, 1.05, and 1.21 for these three

employers directly.[2] Thus, the expectations of Crawford et al. (1997) and others that employer involvement in schools would lead to greater early employment success were not supported. Furthermore, the model in which the work-related school variable made a significant contribution was for the PSE sample, the youth who were pursuing postsecondary education—not the youth who were primarily in the workforce. In the primarily PSE sample, a standard-deviation-size increase in the number of other (i.e., not employer-involved) work-related programs between schools resulted in $311 more in earnings, or a little less than one tenth of the standard deviation of earnings ($3,340) in this sample. Comparison of this variable's coefficients in the two models indicates that the early employment success value of being in schools with more of these other work-related programs does differ for the two types of students, being worth $471 more earnings per standard-deviation unit in the PSE sample than in the primarily workforce sample. One possible explanation for this result is that those youth who pursue postsecondary education are more disposed than those who enter the workforce directly from high school to make use of these frequently voluntary and personal planning programs, and that these programs do in fact help those who use them to obtain better paying jobs. Finally, when special attention was given to the value of such programs specifically for females, Blacks, and Hispanics—groups that have traditionally had less success in the labor market—there was no indication that school programs of either type differentially help these groups.

Among the reasons that these general school level variables did not each contribute individually in both models is that they are highly related (r = .72 in both samples), so that multicollinearity may have obscured their effects. In order to study this possibility, I estimated models alternately with each of the two pulled out and with both combined to form a single variable. However, these modifications did not result in any change in statistical significance for these variables, and made no difference in the statistical significance of the other variables in the models.

Another possible reason for lack of significance is insufficient reliability in the measurement of these variables. I used Cronbach's Alpha Coefficient, an internal consistency estimate of reliability that can be calculated with SPSS, to determine the extent of measurement error in these two work-related school variables. The Alpha Coefficient for the employer-involvement variable was .72 in the workforce sample and .71 in the PSE sample, while it was .85 for the other work-related school programs variable

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interval scale variables, having probabilities of occurrence well above any significance level.

[2] As mentioned in the description of the sample, regression analyses were conducted with a sample that included five extreme outliers that were omitted in developing the models in Table 1. One of the two coefficients that differed for those models and the ones in Table 1 was the coefficient for the employer involvement variable in the primarily PSE sample, where the model with the outliers had a statistically significant negative coefficient. I have no explanation for this result and therefore propose that it was a Type II error.

in both samples. Any value less than 1.00 indicates some degree of unreliability and theoretically attenuates the extent of correlation the variable can have with any other variable (cf. Helmstadter, 1964, pp. 83–87). Of course, the lower the observed correlation between these work-related school variables and the earnings variable, the less chance that the observed relationship will be statistically significant. Thus, it is possible that the employer-involvement measure and, to a lesser extent, the other work-related school measures in the present study were not sufficiently reliable to reveal true effects.

Still another possible reason for the observed results is that the measures used here may not adequately measure the impact of programs on students. Specifically, they do not measure the intensity of work-related programs in a school—only the breadth or number of those programs. As pointed out by Stull and Stull (1999) and Stull, Sanders, and Stull (2000) in prior use of the NELS items composing these two measures, the measures allow for the possibility that there might be a wide variety of programs with only a few employers involved or with only a few students participating in each. This line of reasoning leaves open the possibility that research with indices of the intensity of participation in work-related programs might reveal an impact on subsequent employment success. It should be noted, however, that the Stulls and the present author have not been successful in constructing such depth indices from the NELS data to test this line of reasoning.[3]

Other School Variables. One of the four other school variables made a statistically significant contribution to earnings in each of the two models. In the PSE model, the percentage of seniors involved in vocational education made an independent contribution. However, in terms of effect size, this variable was worth only $95 in earnings per standard-deviation-unit increase to those PSE youth. This very weak, though statistically significant, school variable can be interpreted as an aspect of strength or depth of work-related programs at a school. The schools with a higher percentage of students with vocational-education majors would most likely devote more resources to both the vocational-education program itself and the job placement after the program. However, this variable made a statistically significant contribution only in the PSE model. Even so, the coefficients for this variable did not differ significantly in the two models.

The other of the four school variables to make a significant contribution to earnings—percentage of students going on to 4-year colleges—contributed in a negative direction to earnings, but only in the model for the youth primarily in the workforce. In terms of effects, the workforce youth who went to high schools with many college-bound students earned $159 less than such youth who went to high

[3] The school administrator survey in NELS does not contain questions about levels of participation in these programs. The student questionnaire in NELS does not contain many of the relevant questions either, and where it does, the sampling does not allow for reliable aggregation to the school level.

schools with one standard deviation less percent of college-bound students. I interpret this small but statistically significant finding to be the result of the value placed on postsecondary education (versus work) in a student's environment, with somewhat higher valuing of PSE leading to less serious and intensive jobs. However, the coefficients for this variable in the two models did not differ significantly from one another, so we cannot infer that this variable operates differently for the two samples.

Vocational-Education Concentration. While most of the preceding school-related variables—which were at the school level—did not make contributions to the estimation of earnings, there are school-related individual variables that did contribute to the models in this study. First, concentration of studies in vocational education made a significant contribution to earnings in the primarily workforce model, with the difference between that model and the PSE model also being statistically significant. In terms of effect size, concentrating in vocational education was worth $1,006 in earnings in the primarily workforce sample—equaling between a fifth and a sixth of the standard deviation of earnings in this sample, $5,603. The conclusion from the Stern et al. (1995) summary of past research suggests that this result occurred because the employment found by the workforce-sample youth called for the specific skills provided in the youth's vocational-education programs. An alternative interpretation is that the vocational-education programs in this sample provided more general skills required for success in whatever kind of job the person had—as Mañe (1999) has suggested. The result that the two samples differ here, however, implies that the vocational-education major was not sufficiently general to provide an employment advantage for the youth who were primarily involved in PSE.

Further complicating the picture is the interaction between vocational education and gender. In the PSE sample, males do not benefit from vocational education, while females do.[4] The effect for females is substantial, equaling $853 more in annual earnings than the PSE-sample females who did not have a vocational-education concentration.[5] The related coefficients for this interaction differ

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[4] As mentioned in the description of the sample, regression analyses were conducted with a sample that included five extreme outliers that were omitted in the models in Table 1. One of the two coefficients that differed for those models and for the ones in Table 1 was the coefficient for the interaction between females and vocational education concentration in the primarily workforce sample, where the model with the outliers had a statistically significant negative coefficient. When analyzed more closely, the advantage vocational education gave to males in this sample was much more pronounced than it was for females in this sample. However, this finding does not change the remainder of the discussion of the "vocational education X female"interaction.

[5] The PSE female without vocational education has $811 less than the PSE male without vocational education. In contrast, the PSE female with vocational education counters the $811 handicap of being a female with a small $54 effect for being a vocational-education major but a large $799 effect of being a female with a vocational-education major. For the comparison between the PSE and workforce samples, the workforce-sample values were computed with the respective coefficients for that model. The resulting advantage in the workforce sample for females with vocational-education majors was $343. Thus, the difference in vocational-education effect size between females in the PSE sample and those in the workforce sample is $853 minus $343, or $510.

significantly between the models, with a $510 advantage for vocational-education females in the primarily PSE sample over vocational-education females in the primarily workforce sample. Pursuing the line of reasoning given for general vocational-education effects, I interpret these interaction differences as arising from greater likelihood of a match between high-school vocational-education programs and the jobs that produce earnings for PSE females than for workforce females. The other side of this finding is that the match between program and job for males is much better in the workforce sample than in the PSE sample. Thus, there is a clear need to consider differences in the areas of employment by gender as a function of primary activity (i.e., work or education). This topic is considered further in the discussion of the overall differences between the models, which immediately precedes the summary at the end of the paper.

General Cognitive and Communication Skills. Related to the issue of skills arising from vocational education is the issue of whether general cognitive and communication skills are also important for the early employment success in the "new economy." In this study, these skills were assessed in two ways. One was a very general indicator of academic capability, rank in graduating class. The other was a more specific measure of basic skills, a combination of standardized reading comprehension and mathematics tests. Neither of these two indicators was a statistically significant contributor to earnings for the youths who were primarily involved in the workforce. And while the very general indicator (i.e., rank in class) was not a significant contributor in the PSE model either, the more focused basic-skills measure (i.e., the combined reading and math tests) was negatively related to earnings in the PSE model. In terms of effect size, an increase of one standard deviation in cognitive skills resulted in a $245 decrease in earnings for the youth in the PSE sample. These results certainly provide no support for the position that better cognitive and communication skills of recent high-school seniors were being rewarded by the labor market in the early 1990s. The significant negative relation of the basic-skills test to earnings for the PSE sample can be interpreted to mean that the more cognitively skilled were involved in education instead of work, and therefore they were earning less because they were employed less. This would be expected if there were other sources of financial support such as scholarships more available to them than to the lower scoring youth in the PSE sample.

Race/Ethnicity. The contributions of the other variables in the primarily workforce model are, with few exceptions, what one would expect from previous research. Blacks had significantly lower earnings than Whites. However, the statistical significance of that difference was present only in the primarily workforce sample. In fact, the difference between the workforce and PSE samples was statistically significant. This means that with other factors (e.g., family socioeconomic status, work experience, and general cognitive skills) held constant, Black youth who are involved in PSE have

earnings that are more equal to those of White youth than do the Black youth who are primarily involved in the workforce. In terms of effect size, Blacks in the workforce sample had $1,953 less income than Whites, but that amount was reduced by $1,716 (i.e., down to $237 less than Whites) in the primarily PSE sample. Further study is needed to determine if this result is related to differences between the type or amount of work sought by and available to Black youth in the primarily PSE population and that sought by and available to those in the primarily workforce population.

Almost the reverse findings apply the in case of Native Americans. Native Americans earned significantly less than Whites in the PSE sample, but not in the workforce sample. However, the difference between the coefficients in the two samples did not differ significantly from one another. Although the difference in findings between Native Americans and Blacks may reflect different circumstances of the youth in these two categories, I believe that it is more likely that the low level of statistical significance for the Native Americans in the PSE sample, the lack of significant differences between the Native American coefficients in the two models, and the very low number of Native Americans in each of the samples (less than 1% of each sample), taken in combination, suggest that this study's findings for Native Americans are unreliable. The two other ethnic/racial groups in this study, Asians and Hispanics, did not differ significantly from Whites in either sample. Also, as previously noted, neither of the work-related school variables (i.e., employer involvement or the other work-related programs) was shown to affect Blacks or Hispanics any differently from Whites.

Gender. Similar to other studies of determinants of pay, this study found that females earned significantly less than males. This was true in both the workforce and PSE samples. However, as with Blacks compared to Whites in this study, females were more comparable to males in the PSE sample than they were in the primarily workforce sample. In terms of effect size, the gap was $2,383 (or about 42% of the standard deviation for earnings) in the primarily workforce sample and $811 (or about 24% of the standard deviation of earnings) in the primarily PSE sample. Thus, the females in the primarily PSE sample were $1,572 better off than the primarily workforce females in comparison to the males in their respective samples. Again as with the finding for Blacks, further study is needed to determine if this result is related to differences in the type or amount of work sought by or available to youth in the primarily PSE population from that sought or available to the primarily workforce population.

Also related to gender differences in earnings is the previously discussed difference in the value of concentrating in vocational education between females in the PSE sample and those in the workforce sample. The interpretation in that discussion applies here as well: There may be a greater likelihood for PSE females than for workforce females to find a match between their high-school vocational-education programs and their later work. Extending that reasoning to the differences between the PSE and

workforce models for all females—not just those who concentrated in vocational education in high school—one can conclude that the more educationally oriented females have skills and perhaps other characteristics that better match the demands of the labor market. It is also possible that females in the PSE population face less discrimination than those who are primarily in the workforce. Additional study is needed to test these alternate interpretations.

Socioeconomic Status. Other individual characteristics also contribute to the models in this study. Family socioeconomic status (SES) was negatively related to earnings in the PSE sample. In terms of effect size, being in the fourth quartile in family SES resulted in $748 less than being in the first quartile. In the workforce model, SES was not significantly related to earnings. However, the SES coefficients in the two models do differ significantly, with the PSE sample youth in the fourth quartile of family SES making $995 less than their workforce-sample counterparts, when each are compared with the first quartile SES group in their respective samples. The difference in the role played by SES in the two models seems straightforward: When youth are in postsecondary education programs, they have less time to devote to work and thus rely to the extent possible on parents to pay the bills. The more family resources there are, the less the youth need to have their own earnings. Without the PSE program to take their time, the workforce youth can depend more on their own earnings and are expected to do so.

Hours Worked Outside High School. Hours worked during senior year was the only variable in this study to contribute in both models in almost the same way. As in past studies, this variable was directly related to earnings. In the primarily workforce sample, the effect was an increase of $910 in earnings for each standard deviation increase. In the primarily PSE sample, the comparable effect was a $623 increase. The difference between the models on this variable was not statistically significant. This effect in both samples may reflect skills obtained in work experience during senior year. On the other hand, it may be the result of other variables—such as majoring in vocational education or having a positive orientation toward work—that determine both the hours worked during senior year and earnings soon after senior year. One recent study that attempts to isolate the specific determinants involved in working during high school concludes that such work experience has unique effects on wages, though those effects are small and dissipate after 6 years (Light, 1999). Because other possibly related variables such as vocational-education major and positive work orientation were included in the present models, I conclude that hours worked during senior year make a unique contribution in both the workforce and PSE models through unique and relevant job skills that the work experience provides.

In addition to serving as a control, the positive work orientation variable showed an independent direct relationship with earnings in the PSE model. Although statistically significant, the effect was only $162 in earnings for a change of one standard deviation on this variable. Also, in the workforce model

there was no significant effect of the variable, and the coefficients for this variable did not differ between the models.

Local and Regional Labor Markets. The other contributors to the models were ones representing labor markets. The suburban market when compared to the urban market had a different effect in the PSE and workforce models. In the PSE model, the suburban location had essentially no effect on earnings. However, in the workforce model, it had a substantial effect, amounting to $676 over the urban labor market. I propose that this difference between samples arises from the primarily local nature of this age group's labor market, in combination with (a) the greater likelihood that the workforce sample—in comparison with the PSE sample—remained in the same general location as their high school and (b) the probability that employment opportunities for entry-level workers were greater in the suburbs than in cities (Holzer, 1996, ch. 2).

Also, the Midwest, South, and West all produced more earnings than did the Northeast, though the differences between each of these areas and the Northeast reached statistical significance in only three of the six regional comparisons in the two models. While the Midwest and South differed significantly from the Northeast only for the primarily workforce sample, the West differed from the Northeast only in the PSE sample. However, only in the case of the comparisons between the South and the Northeast did the coefficients in the two models differ significantly from one another. Nonetheless, these findings highlight the importance of differences in the regional labor markets in the further study of the primarily workforce and primarily PSE populations.

Differences Between Models. The models differ significantly between coefficients for 8 of the 22 variables and one of the nine interactions. Variable-specific implications of the differences between models for the two samples were discussed in the previous paragraphs, along with the discussion of the effects of each variable in each model. Some interpretations of the differences as discussed in the preceding paragraphs do, however, overlap.

Most generally, there are interpretations that earnings are related to the *match between skills supplied (broadly conceived to include any relevant cognitive and other personal characteristic) and skills needed in the labor market.* The closer is the match between skills supplied and skills needed, the higher are the earnings. This general explanation is most evident in the interpretation of vocational education being worth more for the workforce sample (where youth are more likely to have gotten employment related to their high-school vocational training) than in the PSE sample (where youth are more likely to have obtained work different from their high-school vocational education). When this interpretation is used in explaining the difference between males and females in the value of vocation

education, it suggests that females pick up some general job-relevant skills that males develop outside their vocational-education programs.

I suggest that an insight into what the general job-relevant skills are that females get from vocational education and males get outside their schooling can be drawn from another finding of the study. That finding was that PSE youth benefited from work-related school programs that were essentially voluntary and from personal planning programs, whereas workforce youth did not benefit significantly from those programs. The implication drawn from this finding is that initiative and the tendency to plan are general skills more required by the PSE sample job market than by the workforce sample job market. On the basis of this reasoning, I suggest that females may have developed these characteristics in their vocational-education programs, whereas males developed them outside their programs.

This line of reasoning can be extended to interpretation of the smaller gender and racial gaps in the PSE sample than in the workforce sample. Females are more similar to males and Blacks are more similar to Whites in the PSE sample because the females and Blacks who are primarily in PSE after high school are more similar to males and Whites, respectively, in initiative-taking and propensity for planning than their counterparts are in the skills required for success in the primarily workforce sample.

The other major overlap among interpretations of differences between models in individual variables' effects is the *relative amount of time that the youth spend working*. First, the negative coefficient of the cognitive-skills test scores in the PSE model versus the essentially zero coefficient of that variable in the workforce model was interpreted as the result of the brighter youth in the PSE sample needing to work less, because they were more likely to have scholarships for expenses than the less bright youth in the PSE sample. There was no such distinction in the workforce sample. In a related fashion, family SES was supportive in the PSE sample, so that youth from higher SES families could devote more time to studies and less time to work—resulting in lower earnings for higher SES youth in the PSE model.

The remaining differences between the workforce and PSE models were among the variables included as indicators of the *local and regional labor markets*. Suburban (versus urban) location of the youths' schools was a positive factor in the workforce sample but had essentially no effect in the PSE sample. This finding was interpreted as the result of the workforce population's tendency to work closer—in comparison to the PSE population—to where they were in high school, plus the suburban labor market's better pay and/or greater opportunity for employment. However, this explanation does not extend to the regional differences that I found between the models. This difference was statistically significant only in the comparison between the South and the Northeast, with the South being much more

favorable in the workforce model and being far from significantly greater in the PSE model. Because there was no distinctive pattern of findings among the regions, however, I was not able to present an interpretation of these findings. I suggest that regional differences be included in future research of differences between primarily workforce and primarily PSE populations in the study of early employment success.

Summary. In summary, the study confirms many findings of previous research, but also has several unique aspects. The highlights of the findings are as follows:

1. The number of high-school programs that involved employers was not found to contribute to early employment success.
2. The number of other work-related high-school programs did, however, make a contribution to earnings, though only in the primarily postsecondary education (PSE) populations. This difference in findings for the primarily workforce and primarily PSE samples suggests that studies of high-school effects need to consider as closely as possible whether students make use of the frequently voluntary work-related programs that high schools offer.
3. The interpretation of the two above findings also suggests the importance of using measures of intensity or depth of schools' work-related programs, going beyond the simple counts of programs in a school that were used in the present study.
4. Concentration in vocational education during senior year did have payoff for earnings in the first full calendar year after high school, though this effect did not apply to males who went primarily into PSE. The gender difference may arise from differences in the match between skills (broadly used to include a variety of personal characteristics) and jobs obtained by youth in these two populations.
5. The racial and gender gaps in earnings were significantly less in the PSE sample than in the workforce sample. This finding was interpreted as arising from lesser differences in related skills possessed by Blacks and Whites (in the one comparison) and by females and males (in the other comparison) in the PSE population than in the workforce population. Other evidence suggests that the relevant skills are propensities for personal planning and taking initiative, which are more similar between racial and gender categories in the PSE population than in the workforce population.
6. However, there was no support for the position that earnings in the early labor market in the early 1990s were related to general cognitive and communication skills *as measured by class rank or math-plus-reading tests.*

7. As indicated in several of the points above, there are important ways in which high-school programs may affect differently the early employment success of those youth who go on to postsecondary education programs that that of youth who are primarily in the workforce soon after high school. In addition to the importance of studying the employment effects of programs on PSE youth as well as on workforce youth, there is heuristic value in including both in such studies—such as the postulation of the initiative-taking and planful characteristics in the present study.

Acknowledgements

This research has been supported in part by the Office of Educational Research and Improvement of the U.S. Department of Education through a contract to the Mid-Atlantic Laboratory for Student Success at Temple University, and in part by the Center for Research in Human Development and Education at Temple University. I much appreciate the valuable comments and ongoing support of Drs. William Stull and Michael Bognanno, both faculty members of the Economics Department at Temple University. The opinions expressed do not necessarily reflect the positions of these supporting agencies or individuals, and no official endorsement should be inferred.

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Appendix 1. Sources of Data for Variables

Variables	NELS Source	Coding
Dependent Variable		
Earnings for 1993	F3: TOTLEAR2	As reported from single question. Missing not in sample.
Work-related School Variables:		
# programs involving employers	F2C9C, -D, -F; F2C15B; F2C20A thru -E	Sum of "yes" answers—have program or service: (1) Coop. ed. (2) Other work experience (3) Tech-prep (4) Job fairs (5) Job listings in school from business (6) Recommendations requested by businesses (7) School adopted by business (8) Incentive program sponsored by business (9) Antidrug program sponsored by business. Missing = 0.
# other work-related programs	F2C9A, -B, -E; F2C15A, -C thru -F; F2C19A thru -C	Sum of "yes" answers—have program or service. (1) Job placement services (2) Employment transition counseling (3) Vocational interest/ability assessment (4) Interest inventories provided (5) Provide letters of recommendation (6) Practice job interviews (7) Arrange job interviews (8) Job-placement courses (9) General job-placement services (10) Job-placement counseling (11) Career-readiness seminars. Missing = 0.
Other School Variables		
% seniors in vocational ed.	F2C7D1 thru -9	Sum of percentages for each of 9 programs. Missing = 0.
% graduates going to 4-yr. college	F2C27B	As reported from single question. Missing = 0.
% enrollment who are White	F2C22D	As reported from single question. Missing = 0.
Total student enrollment	F2C1	As reported from single question. None missing.
School-Related Individual Variables		
If voc. ed. concentration in sr. yr.	F2RTRPRG	If any of 3 answers including "vocational," coded 1; else = 0
Rank in senior class (into 5 groups)	F2RRANK	1^{st} thru 10^{th} = 1; 11^{th} thru 30^{th} = 2; 31^{st} thru 60^{th} = 3; 61^{st} thru 100^{th} = 4; else = 5
Cogn. skills (reading + math test)	F22XCOMP	As reported from single question. Missing = mean of others.
Other Individual Variables		
If Asian	F3QRACE	Recoded 1 = 1, else = 0.
If Black	F3QRACE	Recoded 3 = 1, else = 0.
If Hispanic	F3QRACE	Recoded 2 = 1, else = 0.
If Native American	F3QRACE	Recoded 5 = 1, else = 0.
If female	F3SEX	Recoded 2 = 1, else = 0.
Family SES—in quartiles	F2SES1Q	As reported from this single question. Missing = mean of others.
Hours worked during senior year	F2S88	Coded midpoint of 8 categories (e.g., 1-5 = 3); over 40 = 43, else = 0.
Positive work orientation	F3WORKO	As reported from single question. Missing = mean of others.
Local & Regional Labor Market		
If from suburban school	F2: G12URBN3	Recoded 2= 1, else = 0.
If from rural school	F2: G12URBN3	Recoded 3 = 1, else = 0.
If from school in the Midwest	F2: G12REGON	Recoded 2 = 1, else = 0.
If from school in the South	F2: G12REGON	Recoded 3 = 1, else = 0.
If from school in the West	F2: G12REGON	Recoded 4 = 1, else = 0.

Table 1. Effects of Work-related School Variables, Other School Variables, School-related Individual Variables, Other Individual Variables, and Local and Regional Variables on Earnings for First Calendar Year after Senior Year

Variables	Primarily Work Sample		Primarily PSE Sample		Between Samples	
	Coeff.	Stand. Err.	Coeff.	Stand. Err.	Diff.	SE of Diff.
Work-related School Variables						
# programs involving employers	60.03	83.68	-57.07	51.41	117.10	98.21
# other work-related programs	-49.46	58.55	97.29 ***	36.47	-146.75 **	68.98
Other School Variables						
% seniors in vocational education	3.50	5.50	5.40 *	3.27	-1.90	6.40
% graduates going to 4-yr. college	-7.31 *	4.45	-0.52	2.28	-6.79	5.00
% total enrollment who are White	1.06	4.08	-2.97	2.54	4.03	4.81
Total student enrollment	-0.11	0.13	0.01	0.08	-0.12	0.15
School-Related Individual Variables						
If voc. ed. concentration in sr. yr.	1005.81 ***	305.48	53.80	285.78	952.01 **	418.32
If top 10 in senior class	491.02	617.01	-100.15	200.37	591.17	648.73
If 11th-30th in senior class	264.56	356.84	-13.53	171.89	278.09	396.08
If 31st-60th in senior class	-4.91	305.69	5.67	158.07	-10.58	344.14
If 61st-100th in senior class	232.63	279.97	35.35	164.63	197.28	324.79
Cogn. skills (reading + math test)	-2.25	12.09	-30.07 ***	7.58	27.82 *	14.27
Other Individual Variables						
If Asian	-276.05	471.42	-242.67	192.92	-33.38	509.37
If Black	-1953.29 ***	751.41	-237.39	541.94	-1715.90 *	926.45
If Hispanic	-599.06	643.26	-56.29	397.25	-542.77	756.04
If Native American	-610.41	793.52	-1146.26 *	622.78	535.85	1008.73
If female	-2382.58 ***	458.48	-811.38 ***	264.66	-1571.20 ***	529.39
If family SES in 2nd quartile	178.88	224.08	186.29	181.22	-7.41	288.19
If family SES in 3rd quartile	251.39	248.12	-267.42	171.35	518.81	301.54
If family SES in 4th quartile	246.39	359.55	-748.37 ***	176.09	994.76 ***	400.35
Hours worked during senior year	75.89 ***	7.57	62.72 ***	5.33	13.17	9.26
Positive work orientation	0.63	3.16	5.74 ***	1.92	-5.11	3.70
Selected School X Indiv. Effects						
Employer involvement X Black	-226.84	176.96	-147.61	132.67	-79.23	221.17
Employer involvement X Hispanic	178.84	155.25	-3.82	104.53	182.66	187.16
Employer involvement X female	-44.01	111.52	83.08	65.67	-127.09	129.42
Other sch. career-related X Black	204.72	132.41	-1.74	95.86	206.46	163.47
Other sch. career-related X Hispanic	-90.36	111.83	-4.16	73.53	-86.20	133.84
Other sch. career-related X female	22.48	81.08	-70.09	47.28	92.57	93.86
Voc. Ed. Concentration X Indiv.						
Voc. ed. X Black	328.07	725.72	-364.70	769.74	692.77	1057.91
Voc. ed. X Hispanic	196.05	694.39	-103.26	541.64	299.31	880.65
Voc. ed. X female	-662.48	440.99	799.20 **	372.98	-1461.68 ***	577.57
Local & Regional Labor Market						
If from suburban school	675.86 ***	258.86	-1.81	152.19	677.67 **	300.28
If from rural school	140.30	286.66	-270.91	171.71	411.21	334.15
If from school in the Midwest	684.08 **	295.16	221.27	153.99	462.81	332.91
If from school in the South	830.41 ***	298.03	132.63	162.34	697.78 **	339.38
If from school in the West	27.75	337.80	506.43 ***	180.50	-478.68	383.00
(Constant)	8131.08 ***	892.23	5137.70 ***	550.33		
N	3,547		3,757		7,304	
F-statistic	12.51 ***		12.04 ***		37.29 ***	
Adjusted R^2	0.105		0.096			

* .10 significance level
** .05 significance level
*** .01 significance level

Table 2. Effect Sizes of Statistically Significant Coefficients and Differences Between Coefficients

	Primarily Workforce Sample		Primarily PSE Sample		Workforce - PSE	
Variables	**Coefficient**	**Effect Size***	**Coefficient**	**Effect Size***	**Difference**	**Effect Size****
Work-related School Variables						
# other work-related programs			97.29	$311	-146.75	-$471
Other School Variables						
% seniors in vocational education			5.40	$89		
% graduates going to 4-yr. college	-7.31	-$158				
School-Related Individual Variables						
If voc. ed. concentration in sr. yr.	1005.81	$1,006			952.01	$952
Cogn. skills (reading + math test)			-30.07	-$245	27.82	$225
Other Individual Variables						
If Black	-1953.29	-$1,953			-1715.90	-$1,716
If Native American			-1146.26	-$1,146		
If female	-2382.58	-$2,383	-811.38	-$811	-1571.20	-$1,571
If family SES in 4th quartile			-748.37	-$748	994.76	$995
Hours worked during senior year	75.89	$910	62.72	$621		
Positive work orientation			5.74	$161		
Voc. Ed. Concentration X Indiv.						
Voc. ed. X female			799.20	varies***	-1461.68	varies***
Local & Regional Labor Market						
If from suburban school	675.86	$676			677.67	$678
If from school in the Midwest	684.08	$684				
If from school in the South	830.41	$830			697.78	$698
If from school in the West			506.43	$506		

Dependent Variable	**Workforce Sample Stand. Dev.**	**PSE Sample Stand. Dev.**	**Pooled Standard Deviation**
Earnings in 1993	$5,603	$3,340	$6,523

* Effect size = Coefficient for dummy variables; otherwise = coefficient X standard deviation of independent variable.

** Effect size = Difference in coefficients for dummy variables; otherwise = coefficient difference X average of 2 samples' standard deviations (which were essentially the same for the two samples, with highest F-ratio for two related variances being 1.21; see analyses and results section for more).

*** Effect size for this interaction depends on which groups are being compared. For females with vs. females without voc. ed. effect size = $853. For differences between samples for these groups, difference in effect size = $343 - $853 = -$510.

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